

MONTANA PUBLIC EMPLOYEES' RETIREMENT BOARD

TITLE: ACTUARIAL VALUATION ASSUMPTIONS AND METHODS

POLICY: BOARD Admin 09

EFFECTIVE DATE: 2/14/08

- I. **POLICY AND OBJECTIVES.** The objective of this policy is to adopt appropriate actuarial assumptions and methods for the actuarial valuations of the various defined benefit retirement systems the Board administers.
- II. **APPLICABILITY.** This policy applies to all defined benefit retirement systems administered by the Board.
- III. **UNIVERSAL ASSUMPTIONS FOR ACTUARIAL VALUATIONS.** The Board adopts the following actuarial assumptions and methods for all defined benefit retirement systems it administers:
- A. net investment earnings assumption – 8%;
 - B. general wage increase assumption – 4.25%;
 - C. actuarial cost method – entry age cost;
 - D. asset valuation method – 4-year smoothed market;
 - E. probability of marriage assumption – 100% of all non-retired members are assumed to be married. Male spouses are assumed to be four years older than female spouses for all systems except PERS. Male spouses are assumed to be three years older than female spouses in the PERS.
- IV. **SYSTEM-SPECIFIC ACTUARIAL VALUATION ASSUMPTIONS.** The Board adopts the following system-specific actuarial valuation assumptions:

A. Public Employees' Retirement System:

- 1. assumed interest on member contributions – 5%;
- 2. merit salary increase assumptions:

| <u>Years of Service</u> | <u>Annual Increase</u> |
|-------------------------|------------------------|
| 1 | 6.00% |
| 2 | 4.90 |
| 3 | 3.90 |
| 4 | 3.10 |
| 5 | 2.40 |
| 6 | 1.80 |
| 7 | 1.40 |
| 8 | 1.00 |
| 9 | 0.70 |
| 10 | 0.50 |
| 11-15 | 0.30 |
| 16-20 | 0.10 |
| 21 and over | 0.00 |

3. annual retirement rate assumptions:

| <u>Age</u> | <u><30 years service</u> | <u>30+ years service</u> |
|------------|-----------------------------|--------------------------|
| <50 | 0% | 10% |
| 50-54 | 3 | 10 |
| 55 | 3 | 15 |
| 56 | 4 | 15 |
| 57 | 5 | 15 |
| 58 | 5 | 15 |
| 59 | 6 | 15 |
| 60 | 8 | 15 |
| 61 | 15 | 15 |
| 62 | 25 | 25 |
| 63 | 15 | 15 |
| 64 | 15 | 15 |
| 65 | 30 | 30 |
| 66 | 30 | 30 |
| 67 | 25 | 25 |
| 68 | 25 | 25 |
| 69 | 25 | 25 |
| 70+ | 100 | 100 |

4. annual rate of disablement assumptions:

| <u>Age</u> | <u>Male</u> | <u>Female</u> |
|------------|-------------|---------------|
| 22 | - | - |
| 27 | 0.01% | 0.01% |
| 32 | 0.01 | 0.01 |
| 37 | 0.06 | 0.03 |
| 42 | 0.09 | 0.15 |
| 47 | 0.17 | 0.15 |
| 52 | 0.36 | 0.30 |
| 57 | 0.62 | 0.36 |
| 62 | 0.00 | 0.00 |

5. annual rate of other employment terminations assumptions:

Male members:

| <u>Service</u> | <u>Age<30</u> | <u>30-39</u> | <u>40+</u> |
|----------------|------------------|--------------|------------|
| 0 | 30% | 22% | 15% |
| 1 | 25 | 15 | 12 |
| 2 | 16 | 12 | 10 |
| 3 | 14 | 10 | 8 |
| 4 | 10 | 8 | 6 |
| 5-9 | 6 | 6 | 5 |
| 10-14 | 3 | 3 | 3 |
| 15+ | - | 2 | 2 |

Female members:

| <u>Service</u> | <u>Age<30</u> | <u>30-39</u> | <u>40+</u> |
|----------------|------------------|--------------|------------|
| 0 | 30% | 22% | 18% |
| 1 | 25 | 16 | 13 |
| 2 | 16 | 14 | 10 |
| 3 | 14 | 11 | 9 |
| 4 | 10 | 8 | 8 |
| 5-9 | 5 | 5 | 5 |
| 10-14 | 4 | 4 | 3 |
| 15+ | - | 2 | 2 |

No terminations are assumed after age 55 with 5 years of service for either male or female.

6. probability of electing a refund of member contributions upon termination assumptions:

| <u>Age at Termination</u> | <u>Non-vested</u> | <u>Vested</u> |
|---------------------------|-------------------|---------------|
| Under 35 | 100% | 50% |
| 35-39 | 100 | 40 |
| 40-44 | 100 | 40 |
| 45-49 | 100 | 35 |
| 50+ | 100 | 30 |

7. Mortality assumptions among contributing members, service retired members and beneficiaries: males - the 1994 Male Uninsured Pensioner Mortality Table, with ages set back 1 year; females - the 1994 Female Uninsured Pensioner Mortality Table, with ages set back one year. Mortality assumptions among disabled members: males - IRS Social Security Disabled Mortality Male Table published in Revenue Ruling 96-7 for pre-1995 disabilities with ages set back 3 years; females - IRS Social Security Disabled Mortality Female Table published in Revenue Ruling 96-7 for pre-1995 disabilities with ages set forward 1 year for females.

B. Municipal Police Officers' Retirement System:

1. assumed interest on member contributions – 5%;
2. merit salary increase assumptions:

| <u>Years of Service</u> | <u>Annual Increase</u> |
|-------------------------|------------------------|
| 1 | 7.3% |
| 2 | 5.6 |
| 3 | 4.4 |
| 4 | 3.5 |
| 5 | 2.8 |
| 6 | 2.2 |
| 7 | 1.7 |
| 8 | 1.3 |
| 9 | 1.0 |
| 10 | 0.7 |
| 11-15 | 0.4 |
| 16-20 | 0.2 |
| 21 and over | 0.0 |

3. annual retirement rate assumptions:

| <u>Age</u> | <u>With 20 years of service</u> |
|------------|---------------------------------|
| <50 | 20% |
| 50-54 | 25 |
| 55 | 20 |
| 56 | 20 |
| 57 | 20 |
| 58 | 20 |
| 59 | 20 |
| 60 | 20 |
| 61 | 20 |
| 62 | 20 |
| 63 | 20 |
| 64 | 20 |
| 65+ | 100 |

All vested terminated members are assumed to retire when first eligible for an unreduced benefit

4. annual rate of disablement assumptions:

| <u>Age</u> | <u>Male</u> | <u>Female</u> |
|------------|-------------|---------------|
| 22 | - | - |
| 27 | 0.10% | 0.10% |
| 32 | 0.10 | 0.10 |
| 37 | 0.10 | 0.10 |
| 42 | 0.40 | 0.40 |
| 47 | 0.40 | 0.40 |
| 52 | 0.40 | 0.40 |
| 57 | 0.40 | 0.40 |
| 62 | 0.00 | 0.00 |

Ten percent of all disabilities are assumed to be duty-related.

5. annual rate of other employment terminations assumptions for all members:

| <u>Service</u> | <u>Rate</u> |
|----------------|-------------|
| 0 | 10% |
| 1 | 7 |
| 2 | 7 |
| 3 | 6 |
| 4 | 5 |
| 5-9 | 3 |
| 10-14 | 1 |
| 15+ | 1 |

6. probability of electing a refund of member contributions upon termination assumptions:

| <u>Age at Termination</u> | <u>Non-vested</u> | <u>Vested</u> |
|---------------------------|-------------------|---------------|
| Under 35 | 100% | 70% |
| 35-39 | 100 | 60 |
| 40-44 | 100 | 40 |
| 45-49 | 100 | 40 |
| 50+ | 100 | - |

7. Mortality assumptions: for healthy retirees and non-retired member males, the 1994 Male Uninsured Pensioner Table with ages set back one year; for healthy retirees and non-retired member females, the 1994 Female Uninsured Pensioner Mortality Table with no change; for disabled male retirees, the 1994 Male Uninsured Pensioner Mortality Table set forward three years; for disabled female retirees, the 1994 Female Uninsured Pensioner Mortality Table set forward two years; for male beneficiaries, the 1994 Male Uninsured Pensioner Table set back one year; for female beneficiaries, the 1994 Female Uninsured Pensioner Mortality Table set back one year.
8. DROP account assumptions: DROP accounts are assumed to earn the rate of return on the trust fund net of expenses plus 1.5% to cover the minimum 0% earnings guarantee on DROP accounts. 33% of all active members are assumed to elect to enter the DROP upon first attainment of 20 years of service. These members are assumed to elect to participate in the DROP plan for five years. Members who have elected to participate in the DROP are assumed to remain in the DROP until the end of the DROP period elected, unless they die or become disabled while in the DROP.

C. Game Wardens' and Peace Officers' Retirement System:

1. assumed interest on member contributions – 5%;
2. merit salary increase assumptions:

| <u>Years of Service</u> | <u>Annual Increase</u> |
|-------------------------|------------------------|
| 1 | 7.3% |
| 2 | 5.6 |
| 3 | 4.4 |
| 4 | 3.5 |
| 5 | 2.8 |
| 6 | 2.2 |
| 7 | 1.7 |
| 8 | 1.3 |
| 9 | 1.0 |
| 10 | 0.7 |
| 11-15 | 0.4 |
| 16-20 | 0.2 |
| 21 and over | 0.0 |

3. annual retirement rate assumptions:

| <u>Age</u> | <u>With 20 years of service</u> |
|------------|---------------------------------|
| <50 | 0% |
| 50-54 | 5 |
| 55 | 10 |
| 56 | 10 |
| 57 | 10 |
| 58 | 10 |
| 59 | 10 |
| 60+ | 100 |

All vested terminated members are assumed to retire when first eligible for an unreduced benefit

4. annual rate of disablement assumptions:

| <u>Age</u> | <u>Male</u> | <u>Female</u> |
|------------|-------------|---------------|
| 22 | - | - |
| 27 | 0.10% | 0.10% |
| 32 | 0.10 | 0.10 |
| 37 | 0.10 | 0.10 |
| 42 | 0.40 | 0.40 |
| 47 | 0.40 | 0.40 |
| 52 | 0.40 | 0.40 |
| 57 | 0.40 | 0.40 |
| 62 | 0.00 | 0.00 |

Ten percent of all disabilities are assumed to be duty-related.

5. annual rate of other employment terminations assumptions for all members:

| <u>Service</u> | <u>Rate</u> |
|----------------|-------------|
| 0 | 20% |
| 1 | 15 |
| 2 | 10 |
| 3 | 6 |
| 4 | 6 |
| 5-9 | 5 |
| 10-14 | 5 |
| 15+ | 5 |

6. probability of electing a refund of member contributions upon termination assumptions:

| <u>Age at Termination</u> | <u>Non-vested</u> | <u>Vested</u> |
|---------------------------|-------------------|---------------|
| Under 35 | 100% | 70% |
| 35-39 | 100 | 60 |
| 40-44 | 100 | 40 |
| 45-49 | 100 | 40 |
| 50+ | 100 | - |

7. Mortality assumptions: for healthy retirees and non-retired member males, the 1994 Male Uninsured Pensioner Mortality Table with ages set back one year; for healthy retirees and non-retired member females, the 1994 Female Uninsured Pensioner Mortality Table with no change; for disabled male retirees, the 1994 Male Uninsured Pensioner Mortality Table set forward three years; for disabled female retirees, the 1994 Female Uninsured Pensioner Mortality Table set forward two years; for male beneficiaries, the 1994 Male Uninsured Pensioner Mortality Table set back one year; for female beneficiaries, the 1994 Female Uninsured Pensioner Mortality Table set back one year. Seventy Percent of all member deaths are assumed to be duty-related.

D. Sheriffs' Retirement System:

1. assumed interest on member contributions – 5%;

2. merit salary increase assumptions:

| <u>Years of Service</u> | <u>Annual Increase</u> |
|-------------------------|------------------------|
| 1 | 7.3% |
| 2 | 5.6 |
| 3 | 4.4 |
| 4 | 3.5 |
| 5 | 2.8 |
| 6 | 2.2 |
| 7 | 1.7 |
| 8 | 1.3 |
| 9 | 1.0 |
| 10 | 0.7 |
| 11-15 | 0.4 |
| 16-20 | 0.2 |
| 21 and over | 0.0 |

3. annual retirement rate assumptions:

| <u>Age</u> | <u>With 20 years of service</u> |
|------------|---------------------------------|
| <50 | 10% |
| 50-54 | 20 |
| 55 | 35 |
| 56 | 15 |
| 57 | 15 |
| 58 | 20 |
| 59 | 40 |
| 60 | 40 |
| 61 | 40 |
| 62 | 40 |
| 63 | 40 |
| 64 | 40 |
| 65+ | 100 |

All vested terminated members are assumed to retire when first eligible for an unreduced benefit

4. annual rate of disablement assumptions:

| <u>Age</u> | <u>Male</u> | <u>Female</u> |
|------------|-------------|---------------|
| 22 | - | - |
| 27 | 0.10% | 0.10% |
| 32 | 0.10 | 0.10 |
| 37 | 0.10 | 0.10 |
| 42 | 0.40 | 0.40 |
| 47 | 0.40 | 0.40 |
| 52 | 0.40 | 0.40 |
| 57 | 0.40 | 0.40 |
| 62 | 0.00 | 0.00 |

Ten percent of all disabilities are assumed to be duty related

5. annual rate of other employment terminations assumptions for all members:

| <u>Service</u> | <u>Rate</u> |
|----------------|-------------|
| 0 | 15% |
| 1 | 13 |
| 2 | 9 |
| 3 | 6 |
| 4 | 6 |
| 5-9 | 5 |
| 10-14 | 3 |
| 15+ | 1 |

6. probability of electing a refund of member contributions upon termination assumptions:

| <u>Age at Termination</u> | <u>Non-vested</u> | <u>Vested</u> |
|---------------------------|-------------------|---------------|
| Under 35 | 100% | 70% |
| 35-39 | 100 | 60 |
| 40-44 | 100 | 40 |
| 45-49 | 100 | 40 |
| 50+ | 100 | - |

7. Mortality assumptions: for healthy retirees and non-retired member males, the 1994 Male Uninsured Pensioner Mortality Table with ages set back one year; for healthy retirees and non-retired member females, the 1994 Female Uninsured Pensioner Mortality Table with no change; for disabled male retirees, the 1994 Male Uninsured Pensioner Mortality Table set forward three years; for disabled female retirees, the 1994 Female Uninsured Pensioner Mortality Table set forward two years; for male beneficiaries, the 1994 Male Uninsured Pensioner Mortality Table set back one year; for female beneficiaries, the 1994 Female Uninsured Pensioner Mortality Table set back one year. Seventy percent of all member deaths are assumed to be duty-related

E. Judges' Retirement System

1. assumed interest on member contributions – 5%;
2. merit salary increase assumptions – 0% for all years of service;
3. annual retirement rate assumptions:

| <u>Age</u> | <u><15 years service</u> | <u>Year first attaining 15 years of service</u> |
|------------|-----------------------------|---|
| 60-64 | - | 50% |
| 65 | - | 100 |
| 66 | - | 100 |
| 67 | - | 100 |
| 68 | - | 100 |
| 69+ | - | 100 |
| 70+ | 100% | 100 |

All vested terminated members are assumed to retire when first eligible for an unreduced benefit;

4. annual rate of disablement assumptions:

| <u>Age</u> | <u>Male</u> | <u>Female</u> |
|------------|-------------|---------------|
| 22 | - | - |
| 27 | 0.01% | 0.01% |
| 32 | 0.01 | 0.01 |
| 37 | 0.06 | 0.03 |
| 42 | 0.09 | 0.15 |
| 47 | 0.17 | 0.15 |
| 52 | 0.36 | 0.30 |
| 57 | 0.62 | 0.36 |
| 62 | 0.00 | 0.00 |

Ten percent of all disabilities are assumed to be duty-related

5. annual rate of other employment terminations assumptions for all members – 0% for all years of service;
6. probability of electing a refund of member contributions upon termination assumptions – 0%;
7. Mortality assumptions among contributing members, service retired members and beneficiaries: males - the 1994 Male Uninsured Pensioner Mortality Table, with ages set back 1 year; females - the 1994 Female Uninsured Pensioner Mortality Table, with ages set back one year. Mortality assumptions among disabled members: males - IRS Social Security Disabled Mortality Male Table published in Revenue Ruling 96-7 for pre-1995 disabilities with ages set back 3 years; females - IRS Social Security Disabled Mortality Female Table published in Revenue Ruling 96-7 for pre-1995 disabilities with ages set forward 1 year for females. Ten percent of all member deaths are assumed to be service-related.

F. Highway Patrol Officers' Retirement System

1. assumed interest on member contributions – 5%;
2. merit salary increase assumptions:

| <u>Years of Service</u> | <u>Annual Increase</u> |
|-------------------------|------------------------|
| 1 | 7.3% |
| 2 | 5.6 |
| 3 | 4.4 |
| 4 | 3.5 |
| 5 | 2.8 |
| 6 | 2.2 |
| 7 | 1.7 |
| 8 | 1.3 |
| 9 | 1.0 |
| 10 | 0.7 |
| 11-15 | 0.4 |
| 16-20 | 0.2 |
| 21 and over | 0.0 |

3. annual retirement rate assumptions:

| <u>Age</u> | <u>With 20 years of service</u> |
|------------|---------------------------------|
| <50 | 12% |
| 50-54 | 16 |
| 55 | 15 |
| 56 | 15 |
| 57 | 15 |
| 58 | 15 |
| 59 | 15 |
| 60+ | 100 |

All vested terminated members are assumed to retire when first eligible for an unreduced benefit.

4. annual rate of disablement assumptions:

| <u>Age</u> | <u>Male</u> | <u>Female</u> |
|------------|-------------|---------------|
| 22 | - | - |
| 27 | 0.10% | 0.10% |
| 32 | 0.10 | 0.10 |
| 37 | 0.10 | 0.10 |
| 42 | 0.40 | 0.40 |
| 47 | 0.40 | 0.40 |
| 52 | 0.40 | 0.40 |
| 57 | 0.40 | 0.40 |
| 62 | 0.00 | 0.00 |

Ten percent of all disabilities are assumed to be duty-related

5. annual rate of other employment terminations assumptions for all members:

| <u>Service</u> | <u>Rate</u> |
|----------------|-------------|
| 0 | 15% |
| 1 | 10 |
| 2 | 10 |
| 3 | 10 |
| 4 | 5 |
| 5-9 | 5 |
| 10-14 | 3 |
| 15+ | 1 |

6. probability of electing a refund of member contributions upon termination assumptions:

| <u>Age at Termination</u> | <u>Non-vested</u> | <u>Vested</u> |
|---------------------------|-------------------|---------------|
| Under 35 | 100% | 70% |
| 35-39 | 100 | 60 |
| 40-44 | 100 | 40 |
| 45-49 | 100 | 40 |
| 50+ | 100 | - |

7. Mortality assumptions: for healthy retirees and non-retired member males, the 1994 Male Uninsured Pensioner Mortality Table with ages set back one year; for healthy retirees and non-retired member females, the 1994 Female Uninsured Pensioner Mortality Table with no change; for disabled male retirees, the 1994 Male Uninsured Pensioner Mortality Table set forward three years; for disabled female retirees, the 1994 Female Uninsured Pensioner Mortality Table set forward two years; for male beneficiaries, the 1994 Male Uninsured Pensioner Mortality Table set back one year; for female beneficiaries, the 1994 Female Uninsured Pensioner Mortality Table set back one year. Seventy percent of deaths are assumed to be duty-related

G. Firefighters' Unified Retirement System:

1. assumed interest on member contributions – 5%;
2. merit salary increase assumptions:

| <u>Years of Service</u> | <u>Annual Increase</u> |
|-------------------------|------------------------|
| 1 | 7.3% |
| 2 | 5.6 |
| 3 | 4.4 |
| 4 | 3.5 |
| 5 | 2.8 |
| 6 | 2.2 |
| 7 | 1.7 |
| 8 | 1.3 |
| 9 | 1.0 |
| 10 | 0.7 |
| 11-15 | 0.4 |
| 16-20 | 0.2 |
| 21 and over | 0.0 |

3. annual retirement rate assumptions:

| <u>Age</u> | <u>With 20 years of service</u> |
|------------|---------------------------------|
| <50 | 20% |
| 50-54 | 12 |
| 55 | 15 |
| 56 | 15 |
| 57 | 15 |
| 58 | 15 |
| 59 | 15 |
| 60 | 15 |
| 61 | 15 |
| 62 | 15 |
| 63 | 15 |
| 64 | 15 |
| 65+ | 100 |

All vested terminated members are assumed to retire when first eligible for an unreduced benefit

4. annual rate of disablement assumptions:

| <u>Age</u> | <u>Male</u> | <u>Female</u> |
|------------|-------------|---------------|
| 22 | - | - |
| 27 | 0.10% | 0.10% |
| 32 | 0.10 | 0.10 |
| 37 | 0.10 | 0.10 |
| 42 | 0.40 | 0.40 |
| 47 | 0.40 | 0.40 |
| 52 | 0.40 | 0.40 |
| 57 | 0.40 | 0.40 |
| 62 | 0.00 | 0.00 |

Ten percent of disabilities are assumed to be duty-related

5. annual rate of other employment terminations assumptions for all members:

| <u>Service</u> | <u>Rate</u> |
|----------------|-------------|
| 0 | 4% |
| 1 | 2 |
| 2 | 2 |
| 3 | 2 |
| 4 | 2 |
| 5-9 | 1 |
| 10-14 | 1 |
| 15+ | 0 |

6. probability of electing a refund of member contributions upon termination assumptions:

| <u>Age at Termination</u> | <u>Non-vested</u> | <u>Vested</u> |
|---------------------------|-------------------|---------------|
| Under 35 | 100% | 70% |
| 35-39 | 100 | 60 |
| 40-44 | 100 | 40 |
| 45-49 | 100 | 40 |
| 50+ | 100 | - |

7. Mortality assumptions: for healthy retirees and non-retired member males, the 1994 Male Uninsured Pensioner Mortality Table with ages set back one year; for healthy retirees and non-retired member females, the 1994 Female Uninsured Pensioner Mortality Table with no change; for disabled male retirees, the 1994 Male Uninsured Pensioner Mortality Table set forward three years; for disabled female retirees, the 1994 Female Uninsured Pensioner Mortality Table set forward two years; for male beneficiaries, the 1994 Male Uninsured Pensioner Mortality Table set back one year; for female beneficiaries, the 1994 Female Uninsured Pensioner Mortality Table set back one year.

H. Volunteer Firefighters' Compensation Act:

1. annual retirement rate assumptions:

| <u>Age</u> | <u>10 years service</u> | <u>20 years service</u> |
|------------|-----------------------------|-----------------------------|
| <55 | 0% | 0% |
| 55-59 | 0 | 100 |
| 60+ | 100 | 100 |

All vested terminated members are assumed to retire when first eligible for an unreduced benefit.

2. annual rate of other employment terminations assumptions:

| <u>Age</u> | <u>Rate</u> |
|------------|-------------|
| 25 | 12.79% |
| 30 | 12.33 |
| 35 | 11.61 |
| 40 | 10.34 |
| 45 | 8.30 |
| 50 | 5.32 |

3. Mortality assumptions among contributing members, service retired members and beneficiaries: males - the 1994 Male Uninsured Pensioner Mortality Table, with ages set back 1 year; females - the 1994 Female Uninsured Pensioner Mortality Table, with ages set back one year. Mortality assumptions among disabled members: males - IRS Social Security Disabled Mortality Male Table published in Revenue Ruling 96-7 for pre-1995 disabilities with ages set back 1 years; females - IRS Social Security Disabled Mortality Female Table published in Revenue Ruling 96-7 for pre-1995 disabilities with ages set forward 3 year for females.

IV. CROSS REFERENCE GUIDE

The following laws, rules or policies may contain provisions that might pertain to the education provided by the Board. The list should not be considered exhaustive - other policies may apply.

Article VIII, § 15, Montana Constitution
§ 19-2-403, MCA

V. HISTORY

New